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ABSTRACT

The purpose of this study was to measure changes in the anxiety levels and attitudes of black educators toward microcomputer use resulting from participation in a one-semester laboratory course in microcomputer applications. Data were collected over a one-semester period from a class of seven black educators with advanced degrees at Mississippi Valley State University--a historically black institution--who volunteered for the training. A questionnaire assessing anxiety level and attitudes toward microcomputer use was administered both before and after the course, during which educators were trained in using an operating system, word processing, electronic spreadsheets, and database software. Each educator was required to use all software packages. A control group of 30 educators was randomly chosen from the population of black educators at the same university. It was found that, although educators' attitudes towards computers improved with exposure to the microcomputer applications course, their anxiety levels towards computers increased. It is recommended that the study be replicated with the following modifications: (1) establishment of a more homogeneous structure of experimental and control groups; (2) enlargement of the sample size in both groups to reduce the non-random assignment of educators and to provide a larger database for additional statistical calculations; and (3) extension of the study to other cultural groups and to include a comparison of educator attitudes with those of students and staff members. A copy of the attitude survey instrument is appended together with tables showing the results of statistical analyses of the data. (5 references) (GL)

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Computers: Friend or Foe to the Black Educator?

by

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INTRODUCTION

With the proliferation of personal computers in the home and in the workplace, there is an ever increasing demand for the integration of computers into the curricula of both secondary schools and institutions of higher learning. All to often, the approach taken to satisfying such demands involves the training of the current staff of educators in the use of personal computers as a teaching tool and as a research and administrative tool. Studies have indicated that teachers receiving instruction in the use of computers have a higher level of anxiety than students [1].

The anxiety experienced by educators has been mainly attributed to a generalized fear of technology and the fear generated when one is being affected by events one cannot control [2]. Exposure to the use of computers can cause a significant decrease in anxiety [3]. One way to measure such anxiety is to look for possible changes in attitude brought on by continuous exposure to the computer in a classroom setting.

The purpose of the current study is twofold:

1. to measure the anxiety of the black educator

prior to training on the computer, and

2. to measure the change in attitude resulting from exposure to a one semester laboratory course in microcomputer applications.

METHODOLOGY

The data for this study were collected over a one semester period from a class of educators who volunteered for the training. The study was conducted at Mississippi Valley State University, a historically black institution. All educators participating in the study were black. This sample of educators ranged in age from less than thirty five (35) years to over fifty (50) years with a mean age of thirty three and one half (33.5) years. All participants in the training program had advanced degrees, with two doctorates (28.6%) and five masters degree (71.4%). The sample was unevenly distributed by sex with two males (28.6%) and five females (71.4%). The sample size was limited to the number of educators in the training group. Details of the descriptive information collected on the sample are shown in Table 1.

Prior to the course a questionnaire was administered to the participants in the training program (see Appendix A). Included in the questionnaire were seven demographic questions: (1) sex, (2) age, (3) education, (4) area of specialization, (5) previous use of a computer, (6) previous

TABLE 1

Age, Degree, and Sex of the Educators Involved in the Study

Age	Degree				Sex			
	Doctorate		Masters		Male		Female	
	N	%	N	%	N	%	N	%
22 - 35	0	0	1	14.3	0	0	1	14.3
36 - 49	0	0	3	43.9	0	0	3	43.9
OVER 50	2	28.6	1	14.3	2	28.6	1	14.3

Source: Original using Microstat statistical package.

course in computers, and (7) ownership or regular access to a computer. In line with the purpose of the study (to measure anxiety and attitudinal change toward computers), twelve attitude questions were included. Questions number 5, 6, and 13 were reverse coded so that high response numbers would indicate negative attitudes toward computers. For descriptive group statistics on the twelve attitudinal questions see Table 2. Upon completion of the course, each participant was again administered the questionnaire.

During the course, the educators were trained in using an operating system (PC/MS DOS), word processing (WordStar 3.0), electronic spreadsheet (PC-Calc), and database (dBase III) software. Applications were based on each educator's perceived professional needs, i.e. typing papers, keeping a gradebook, budgeting and forcasting, etc. No examinations were given, however, each educator was

TABLE 2

Attitudinal Descriptive Group Statistics

	PRE-TRAINING (N=7)		POST-TRAINING (N=7)		CONTROL (N=30)	
VARS.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
1	3.4286	1.7182	4.1429	1.0690	3.5000	1.3326
2	2.7143	1.2536	3.8571	1.4639	3.1000	1.2959
3	3.2857	1.2536	4.0000	1.0000	3.0333	1.3767
5	4.7143	.4880	4.5714	1.1339	3.9667	1.2726
6	2.4286	.9759	2.5714	1.9881	3.1333	1.3322
7	4.8571	.3780	4.7143	.4880	4.5667	.7279
8	4.7143	.4880	5.0000	.0000	4.0667	1.4126
9	4.2857	.7559	3.7143	1.3801	3.9333	1.4126
10	4.0000	1.5275	4.2857	1.1127	4.2333	1.2229
11	4.1429	.6901	3.7143	1.3801	3.5333	1.3060
12	2.2857	1.8898	2.8571	1.8645	3.1667	1.4162
13	2.7143	1.4960	2.4286	1.1339	3.1667	1.3917

Source: Original using Microstat statistical package.

required to use each type of software. Projects undertaken, using the previously mentioned software packages, had to meet the following criteria:

1. the project had to directly fulfill one of his/her professional needs, and

2. the project had to be preapproved by the instructor of the course.

Each educator spent a minimum of 50 to 70 hours in the course. Thirty seven and one-half (37.5) hours were spent under the direct supervision of the instructor (lecture and hands-on personal computer experience), and 25 or more hours on the individual projects.

A control group of thirty educators (n=30) was randomly chosen from the population of black educators present at the same university. The same questionnaire administered to the black educators in the study was administered to the members of the control group. Comparisons were made between the questionnaire data of the pre-training group and both the post-training and control groups. In addition, the post-training group was compared to the control group. Demographic comparisons are shown in Table 3.

Descriptive statistics were examined to determine homogeneity/lack of homogeneity in the training group prior to the course. Regression analysis was performed to find:

1. the regression equation showing:
    a) variables which entered the equation
    b) r squared values showing the percentage of variation accounted for by the equation, and
    c) p-values showing the probability of receiving this percentage of variation strictly by chance
2. correlation of independent variables with the dependent variable, and
3. t-values and f-values to determine relative importance of the independent variables.

TABLE 3

Demographics of the Trainees and Control Groups Involved in the Study

Sex	Trainees (N=7)	Control (N=30)
Females	71%	30%
Males	29%	70%
Age		
25 - 35	14%	37%
36 - 49	43%	37%
OVER 50	43%	26%
Education		
Doctorates	29%	33%
Masters	71%	60%
Bachelors	0%	7%
Previous Use of a Computer		
Yes	57%	53%
No	43%	47%
Previous Course in Computers		
Yes	57%	47%
No	43%	53%
Ownership or Regular Access to a Computer		
Yes	57%	40%
No	43%	60%

Source: Original using Microstat statistical package.

FINDINGS

DESCRIPTIVE STATISTICS

An examination of the means revealed the following:

1. level of education, owning or regular access to a computer, and future intention to purchase a computer showed homogeneity in the pre-training group.

2. the training and control groups did not statistically come from the same population. Whereas the female/male proportion in the trainee group was 71/29 percent, the female/male proportion in the control group was 30/70 percent. Proportions of age groups, previous use of computers, and previous course in computers changed similarily (see Table 3).

3. A reversal between the pre and post-training groups in the following attitudes:

   a. "Computers are complicated machines" the hypothesis of normality of the mean could be rejected in the pre-training group, but could not be rejected in the post training group.

   b. "I plan to purchase a computer in the next twelve months" showed homogeneity of attitude in the pre-training group population, while showing lack of homogeneity in the post-training group.

   c. "It is more troublesome to do something on the computer than by hand" did not show agreement among the pre-training group, but did show agreement in the post-training group.

   d. "Using the computer is very stressful, i.e. frustrating", the hypothesis that the population is normal of mean could be

rejected for the pre-training group, but could not be rejected for the post-training group.

e. "To use a computer one must understand how it works", did not show statistically significant agreement among the pre-training group, but did show statistically significant agreement among the post-training group.

f. "I have a good understanding of the many applications possible with a computer", did not show homogeneity of agreement in the pre-training group, but did show statistically significant levels of agreement in the post-training group.

REGRESSION ANALYSIS

Regression analyses were performed using both direct and stepwise procedures for the following groups: (1) pre-training versus post-training, (2) pre-training versus control, and (3) post-training versus control (see Appendix B). The results of the regression analyses were mixed and inconclusive.

Using the direct procedure. Seventy two percent of the variance between the pre and post-training groups was explained. However, the p-value of .9477 indicated this result could have been obtained almost 100 percent by chance alone.

In the pre-training versus control analysis the p-value was .0899 (many studies consider a p-value of up to .10 to be significant), but the amount of variance explained was only 48.53 percent. The difference between the pre-treatment and the control groups could be expected (see

point 2 under DESCRIPTIVE STATISTICS) due to lack of homogeneity between the two groups.

In the analysis of the post-treatment versus control groups neither p-value nor r-squared showed statistical significance. The p-value was .1583, and the r-squared was .4443.

Using the stepwise method: (1) The pre versus post-training groups had non-statistically significant p and r-squared values, (2) the pre-training versus control had a highly significant p-value of .0064, but only a medium level of explained variation (r-squared = .4662), and (3) the post-training versus the control groups also had a highly significant p-value (.0117) and a medium r squared (.4024).

Conclusions reached from the regression analysis. The major concern of this study was change in attitude between the pre and post-training groups. The regression analysis failed to produce a statistically significant equation predicting group membership from the combined multiple variables used in the analysis.

DISCUSSION OF RESULTS

In this study, no significant differences were found in pooled attitudinal variables between the pre and post-training groups when using regression analysis. However, five attitudinal questions did show a reversal between the pre and post groups (see Table 4). Therefore, the study did

TABLE 4

Acceptance or Rejection of the Hypothesis That The Population Is Normal of Mean and Standard Deviation

Changed Variables**	Pre-training Rejection	Post-training Rejection	Attitude Change
2 (complicated machines)	Can	Can Not	Improved
6 (plan to purchase)	Can Not	Can	Improved
9 (computer troublesome)	Can	Can Not	Improved
11 (computer stressful)	Can	Can Not	Worse
12 (to use good understand)	Can	Can Not	Improved
13 (have a good understanding)	Can Not	Can	Worse

Source: Original using Microstat statistical package.

**Variable names have been abbrieviated, for full variable names see Appendix A.

did provide knowledge of the effects of computer training on black educators. The educators' attitude toward computers did improve with exposure to a one semester microcomputer applications course. At the same time these educators did indicate increased levels of anxiety towards computers as shown in attitudinal questions 11 (Using a computer is very stressful, i.e. frustrating), and 13 (I have a good understanding of the many applications possible with a computer).

Recommendations for future research. No individual study provides the definitive answer to any research question. The findings of this study will take on additional meaning with replications and extensions. Therefore, recommendations for future research are as follows:

1. Replication of the study should be made with the following modifications:

   a. the control group should be a proportionately stratified random sample, thus overcomming the shortfall of the non-homogeneous structure of the training and control groups in the present study.

   b. the number of group members should be enlarged to reduce the non-random assignment of educators in both the training and control groups.

   c. a larger population sample would provide a larger data base for additional statistical analysis.

   d. the study should be extended to other sub-cultural groups, including but not limited to, Hispanics and Orientals.

   e. extension of the study should be made to a comparison of educators to students and staff members.

As this study indicates, attitudes of black educators completing a one semester microcomputer applications course can be expected to improve. Anxiety levels, on the other hand, can be expected to increase. It can be postulated that without additional exposure to the microcomputer, the black educator's fear of the computer will continue.

Attempts towards integration of the computer into the curricula of institutions of higher learning should not be made on a short-term basis. If the intention is to make the computer into an integral part of the educational process, educators should be given enough time to overcome their innate attitudinal perceptions and fear of the computer.

APPENDIX A

QUESTIONNAIRE

CS 403 MICROCOMPUTER SEMINAR ATTITUDES SURVEY

The following are 6 questions about you. Please put an X beside the answer that is true for you. There are no right or wrong answers, but only what is true for you.

PLEASE ANSWER EVERY ONE OF THE FOLLOWING QUESTIONS

Place an X beside the answer which is true for you.

1. SEX:

____MALE
____FEMALE

2. AGE:

____UP TO 25 YEARS
____25 YEARS TO 35 YEARS
____36 YEARS TO 49 YEARS
____50 YEARS OR OLDER

3. EDUCATION:

____Ph.D
____DBA
____Ed.D
____MS
____MBA
____MA
____M.Ed.
____BS
____B. Bus. Ad.
____BA
____OTHER. EXPLAIN _____
_____

4. AREA(S) OF SPECIALIZATION

____BUSINESS
____EDUCATION
____ENGINEERING
____COMPUTER SC.
____NATURAL SCIENCES
____PHYSICAL SCIENCES
____SOCIAL SCIENCES
____FINE ARTS
____OTHER, EXPLAIN_____
_____

5. HAVE YOU EVER REALLY USED A COMPUTER. ___YES___NO

6. HAVE YOU EVER TAKEN A COURSE ON COMPUTERS. ___YES___NO

PLEASE TURN PAGE

Questionnaire--Continued

Following are 13 statements about computers. Please circle the number that shows the extent to which you agree or disagree with each statement.

1. means you **STRONGLY AGREE** with this statement.

2. means you **AGREE** with the statement.

3. means you **HAVE NO OPINION** on the statement.

4. means you **DISAGREE** with the statement.

5. means you **STRONGLY DISAGREE** with the statement.

EXAMPLE:

COMPUTERS ARE CHEAP. 1 2 3 4 5

If you **STRONGLY AGREE** with this statement you would circle the number 1 like this:

COMPUTERS ARE CHEAP. (1) 2 3 4 5

If you **AGREE** with this statement you would circle the number 2, like this:

COMPUTERS ARE CHEAP. 1 (2) 3 4 5

If you **HAVE NO OPINION** on this statement you would circle the number 3, like this:

COMPUTERS ARE CHEAP. 1 2 (3) 4 5

If you **DISAGREE** with this statement you would circle the number 4, like this:

COMPUTERS ARE CHEAP. 1 2 3 (4) 5

If you **STRONGLY DISAGREE** with this statement you would circle the number 5, like this:

COMPUTERS ARE CHEAP. 1 2 3 4 (5)

Following are more statements like the above example. Start with number 1 and circle the number that best shows how you feel about the statement. Please keep these three things in mind:

PLEASE TURN PAGE

Questionnaire--Continued

A. Give only true answers about what you think. It will help us more if you circle what you really think.

B. You may have as much time as you need, but go fairly fast. Give the first answer that comes to you and do not spend too much time on any statement.

C. Do not skip any statements. CIRCLE EVERY STATEMENT ONE OF THE FIVE WAYS !

1.	COMPUTERS ARE DIFFICULT TO USE.	1	2	3	4	5
2.	COMPUTERS ARE COMPLICATED MACHINES.	1	2	3	4	5
3.	COMPUTERS ARE EASILY DAMAGED BY THE USER.	1	2	3	4	5
4.	I OWN OR HAVE REGULAR ACCESS TO A COMPUTER.	1	2	3	4	5
5.	USING COMPUTERS AT WORK WILL IMPROVE MY PRODUCTIVITY.	1	2	3	4	5
6.	I PLAN TO PURCHASE A COMPUTER IN THE NEXT 12 MONTHS.	1	2	3	4	5
7.	I AM AFRAID THE COMPUTER MIGHT REPLACE ME IN MY JOB.	1	2	3	4	5
8.	COMPUTERS MAKE A LOT OF MISTAKES.	1	2	3	4	5
9.	IT IS MORE TROUBLESOME TO DO SOMETHING ON THE COMPUTER THAN BY HAND.	1	2	3	4	5
10.	INFORMATION RECEIVED FROM COMPUTERS IS NEVER WRONG.	1	2	3	4	5
11.	USING A COMPUTER IS VERY STRESSFUL, i.e. FRUSTRATING.	1	2	3	4	5
12.	TO USE A COMPUTER ONE MUST HAVE A GOOD UNDERSTANDING OF HOW IT WORKS INTERNALLY.	1	2	3	4	5
13.	I HAVE A GOOD UNDERSTANDING OF THE MANY APPLICATIONS POSSIBLE WITH A COMPUTER.	1	2	3	4	5

APPENDIX B

REGRESSION ANALYSIS

TABLE 5

Regression Equations

Direct Regression Equations

Ind. Vars.	Pre vs. Post	Pre vs. Control	Post vs. Control
Constant	-5.1698	2.2000	2.3500
var1	- .6505	.0108	- .0077
var2	.7369	.0111	- .0532
var3	- .3952	- .0842	- .1300
var5	1.6211	- .1300	- .1400
var6	- .0950	- .0866	.0560
var7	.1994	.0965	- .0120
var8	.7823	.0100	- .0407
var9	- .3972	.1200	.0797
var10	.3319	- .0000	- .0262
var11	-1.2331	- .2100	- .0111
var12	- .0519	.1800	.1000
var13	.5054	.0720	.0819
R Squared	.7213	.4853	.4443
Prob.	.9477	.0899	.1583

Stepwise Regression Equations

Ind. Vars.	Pre vs. Post	Pre vs. Control	Post vs. Control
Constant	.3194	1.9292	2.2678
var1			- .0602
var2	.1087		- .1340
var3		- .0848	- .1530
var5		- .1298	.0547
var6		.0905	
var7	- .3846		
var8	.5485		
var9		.1098	
var11		- .2164	.1092
var12		.1813	.0953
var13		.0686	
R Squared	.3359	.4662	.4024
Prob.	.2325	.0064	.0117

Source: Original using Microstat statistical package.

TABLE 6
Correlation of Independent Variables
With the Dependent Variable

Ind. Vars.	Pre vs. Post	Pre vs. Control	Post vs. Control
var1	.26029	.02045	- .19657
var2	.41257	.11966	- .22406
var3	.32208	- .07472	- .28290
var5	- .08805	- .24803	- .19124
var6	.04921	.21676	.15258
var7	- .17408	- .16933	- .08550
var8	.40825	- .19646	- .28056
var9	- .26726	- .10662	.06257
var10	.11471	.07320	- .01751
var11	- .20751	- .19682	- .05516
var12	.16222	.22899	.08267
var13	- .11547	.12812	.21487

Source: Original using Microstat statistical package.

TABLE 7

T-values of Independent Variables Using the Direct Method

Ind. Vars.	Pre vs. Post	Pre vs. Control	Post vs. Control
var1	- .920	.171	- .104
var2	.884	.149	- .739
var3	- .536	-1.559	-2.149
var5	.882	-2.151	-2.458
var6	- .219	1.681	1.122
var7	.218	- .887	- .104
var8	.361	.167	- .670
var9	- .678	1.422	1.005
var10	.394	-0.000	- .315
var11	- .923	-2.299	- .148
var12	- .235	3.065	1.968
var13	.808	1.510	1.620

Source: Original using Microstat statistical package.

TABLE 8

F-values of Independent Variables Using the Stepwise Method

Ind. Vars.	Pre vs. Post	Pre vs. Control	Post vs. Control
var2	1.169		1.640
var3		3.218	6.256
var5		6.610	9.164
var6		3.981	1.629
var7	1.379		
var8	1.767		
var9		3.240	
var11		8.069	
var12		14.099	5.981
var13		2.733	4.714

Source: Original using Microstat statistical package.

NOTES

1. See M. A. Cambre and D. L. Cooke, "Computer anxiety: Definition, measurement, and correlates," Paper presented to the American Education Research Association, New Orleans, LA., April 1984. Also D. S. Honeyman and W. J. White, "Computer Anxiety in Educators Learning to Use the Computer: A Preliminary Report," Journal of Research on Computing in Education. Vol. 20, Winter 1987, pp. 129-38.

2. See R. Baumgarte, "Computer anxiety and instruction," Paper presented to Southeast Psychological Association, New Orleans. LA., Spring 1984.

3. For a few of many see E. W. Jordan and D. F. Stroup, "The behavioral antecedents of computer fear," Journal of Data Education, 1982, Vol. 22, pp. 7-8; and W. G. Powers, "The effects of prior computer exposure on man-machine computer anxiety," Paper presented to the International Communication Association, Montreal, Canada, 1973.

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